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كلية الطب والعلوم الصحية
دائرة العلوم السريرية الطبية
دفعة بصمه طبيب 31
طب بشري

OPHTHALMOLOGY



Ocular pharmacology

Lecture No. **8**

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جروب ((C))

اللجنة العلمية لدفعة بصمة طبيب 31

مندوب الدفعة

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مع تحيات مكتبة الحزمي للخدمات الطلابية والمراجع الطبية

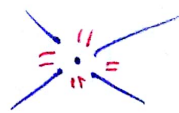
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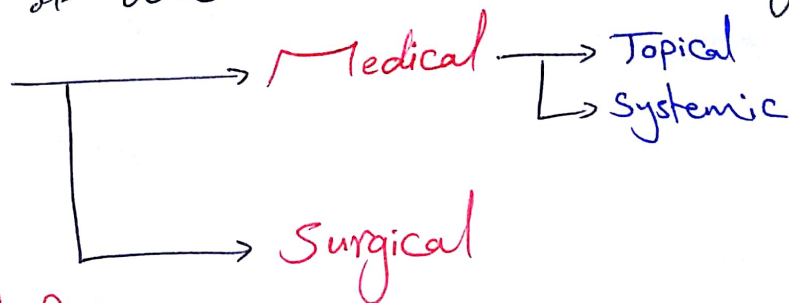
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Ocular pharmacology



* treatment of ocular disease is achieved by



* Medical RX

⇒ Topical treatment As: ①-topical drops

- ↓
- most commonly used in ocular disease
 - More effective.

② ointments

③ Gel

④ - Soft Contact lens is used as topical ocular Rx as in cases of Corneal abrasion to cover the Cornea for protection.

⇒ Systemic treatment

- ↓
- Indicated in some conditions as:
 - Eyelid inflammation
 - Orbital inflammation
 - Uveitis
 - Systemic disease.

⑤ - ocular injection

Ocular injection is part of topical treatment

* Types of perocular injection — Subconjunctival

— Subtenorial

— peribulbar

— Retrobulbar — for anaesthesia

* Intraocular injection

used to introduce the drug inside the eyeball used when topical drugs can't enter into the internal structure of the eyeball.

2 * Intracameral injection used for — $\left[\begin{array}{l} \text{to insert} \\ \downarrow \\ \text{pupil} \\ ? \end{array} \right.$

* Intravitreal injection $\rightarrow$ in Endophthalmitis $\left[\begin{array}{l} \rightarrow \text{Antibiotics} \\ \rightarrow \\ \rightarrow \end{array} \right.$

Systemic $\left[\begin{array}{l} \rightarrow \text{Oral} \\ \rightarrow \text{IV} \\ \rightarrow \text{IM} \end{array} \right.$

Most ocular drugs are drops and you must know the type of the Drops

One drop is effective for Rx.

$\Rightarrow$ 1 drop (one) = 50 microlitre

and the capacity of Conjunctiva is 7-13 microlitres

So One drop is more enough.

أو أكثر

No benefit in $\uparrow$ the drops.

each drop need a period of time to be absorbed depend upon the type of the drugs

How to give drops?

Pull the lower lid then give one drop

It is important to understand the mechanism of the drug absorption & drainage of the drop.

$\Rightarrow$ It's important to give time for drug to be absorbed & when you use two drugs you must put the first drop of the first drug and wait for about 5 minutes & compress the lacrimal sac by finger to prevent the drainage of the drug And to allow the drug to be absorbed Then give the drop of the 2nd drug.

3 ~~50~~ 50 % of drugs need 4 minutes to be absorbed & only 10% of the amount of the drug reach to the aqueous.

Sometimes

We Compress the lacrimal sac to prevent drainage of some drugs and prevent the drugs from reaching to the systemic circulation hence preventing its side effect as when we give Atropine to children we Compress the Lacrimal Sac to prevent its side effect. Atropine may cause Gastritis as side effect in some patients.

Mydriatic

Ointments $\Rightarrow$ usually given at night [Bed time] because $\leftarrow$ it's affect the vision, we don't use it during the morning $\leftarrow$ the Advantage of ointment it's Long acting action

Subtenon injection $\Rightarrow$ usually used postoperatively and when we inject subtenon space the drug reach to the retrobulbar area. as Steroids
 $\therefore$ The drugs stay for along time

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→ Some doctors prefer to inject steroid in the Retrobulbar area instead of the other Routes of injection

→ We use ocular injection when we want the drug to reach to intraocular structures.

→ Intracameral Pilocarpine used to contract the pupil during Cataract Surgery.
type of Acetylcholine Cause miosis

→ Intravitreal injection of VEGF vasopermeative substance [vasoactive materials]

↓
it Causes Neovascularization in Cases of Diabetic Retinopathy.

→ So we use Anti-VEGF to prevent neovascularization in Cases of intraocular tumors.

→ Most Cases of endophthalmitis are difficult to be treated by Topical drugs therefore we use injection as Antibiotics & steroids.

→ Before injection we should measure distance from the limbus for intravitreal injection and it is - 4mm in phakic → presence of Lens
- 3.5mm in pseudophakic → artificial Lens
- 3mm in Aphakic → no Lens

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Comon ocular drug See P.P

* Antibiotics are the most commonly used drugs

* Antiglaucoma $\Rightarrow$ محل أسفل العين

* What are the diagnostic drugs $\left[\begin{array}{l} \rightarrow \text{Rose bengal} \\ \rightarrow \text{Fluorescein} \end{array} \right] \rightarrow \text{dyes}$

* Local Anaesthesia $\left[\begin{array}{l} \text{Surface} \\ \text{Retobulbar} \end{array} \right]$

Antibiotics

Indications : $\begin{array}{l} \underline{1} \text{ pre/post operative} \\ \underline{2} \text{ Conjunctivitis} \\ \underline{3} \text{ preseptal / orbital cellulitis} \\ \underline{4} \text{ styne} \\ \underline{5} \text{ etc.} \end{array}$

oral antibiotics given in cases of preseptal cellulitis & —
— in cases of orbital cellulitis we give IV antibiotics & hospitalization of pt to prevent the CST or brain abscess.

6 - In cases of orbital cellulitis give strong antibiotic + Flagyl and Vancomycin.

⇒ Endophthalmitis is difficult to be treated and some cases don't respond to antibiotics and sometimes doctors do evacuation of the affected eye as a last choice to treat the condition.

⇒ old antibiotics are not used any more these days as

Tetracycline and sulpha because they become resistant to bacteria

⇒ In children Give the safest antibiotic, Amoxicillin

is considered safe for children, Doctor prefer to give Aminoglycoside as Tobramycin.

⇒ Combination drugs as steroids and antibiotics are given only in severe cases and for short duration

⇒ Fucidic acid [eye drops and ointment] is important and in cases of ~~new~~ mucopurulent conjunctivitis or nasolacrimal duct obstruction, Fucidic acid is given in combination with Tobramycin

7 $\Rightarrow$ In case of viral infection give the patient a combination of anti-viral drugs as Acyclovir with Antibiotics for any bacterial infection, steroids are contraindicated and it may worsen the condition [dendritic ulcer become ~~Geo~~ geographical ulcer].

$\Rightarrow$ Anti fungal drugs must only be used in cases of fungal infection - and not given in other conditions, because it is very irritant.

$\Rightarrow$ Most of the fungal infections lead to endophthalmitis and most of the cases end with enucleation as the only choice for treatment.

$\Rightarrow$ Mydriatics and cycloplegic drugs are very common and commonly used in ophthalmic clinics.

$\Rightarrow$ When a doctor prescribes atropin for pt they must write on prescription paper warning Note (Not to be used by another person and must be away from the reach of the children).

Because atropin has bad side effect and has no antidote when applied on the eye.

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indications of mydriatic and cycloplegic:-

- 1) Corneal ulcer $\Rightarrow$ Relieve pain (d.t spasm of ciliary muscle)
- 2) Uveitis $\Rightarrow$ to prevent synechia
- 3) Cycloplegic action $\Rightarrow$ in children < 5 years because they have strong accommodation.

فهمنا اننا نستخدم atropin في حالات (1-20D) و 20D في cycloplegic action. و في حالات accommodation.

- Atropin container has red cap (why)? because it's dangerous drug and not to be used by another person other than patient.
- other cholinergic agonist $\Rightarrow$ pilocarpin.

use: - induce miosis

- in case of open angle glaucoma to $\downarrow$ aqueous secretion and $\uparrow$ aqueous drainage by miosis they are to prevent synechia formation.

- Cholinergic atropin as tropicamide, cyclopentolol and homatropin $\Rightarrow$ they induce mydriasis for:-
Fundoscopy - cycloplegic refraction - ant uveitis

adrenergic agonist:-

- Non selective as epinephrine use in glaucoma.
- alpha-1-agonist as phenylephrine used during operation it's not cycloplegic but it cause mydriasis.
- use in surgery it's strong mydriatic effect allow the surgeon to clean lens and also use in case of pterygium. when phenylephrine applied on pterygium it will cause vasoconstriction to the normal tissue and pterygium will remain red hence determine the abnormal tissue.

- Phenylephrine used also in case of red eye

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يستخدم (الناس) لكي يكون حيوة حياء وهو مفاعلة مقابل - حصة
تفادي الاضرار

- alpha 2 agonist as brimonidine Commonly in case of glaucoma
or after laser surgery for glaucoma used once a day.

«Antiglaucoma»

① B blockers are the most important drugs used in open angle glaucoma
Selective β blocker as betaxolol
Non selective // as timolol

* before prescription of β blocker to the pt. we should be take
full hix of others disease as asthma because it's contraindicated
in this condition

② Carbonic anhydrase inhibitors: - CAI

Systemic used $\rightarrow$ acetazolamide which used in some cases
of $\uparrow$ IOP.

1- severe Congenital glaucoma

2- Severe Post. operation complication only for short duration.

most important side effects: hypokalemia. also cause renal stone

M.B.: Topical CAI used instead of the systemic CAI

منها نستخدم العلاج systemic لنرى المريض يأكل الموز والخبز
ونقول له اول ما نشوف الأعراض الجانبية مع حلول الوقت
يوفق العلاج

* Combination therapy:

B-blocker + CAI $\rightarrow$ famol / Xolamol

• Systemic CAI used in short duration for severe cases
due to its risks for side effect

③ Prostaglandin now day Commonly used because $\downarrow$
side effects.

✓

* MOA: prostaglandins:- ↑ drainage of aqueous through the uveoscleral pathway { 20 % } Consider of whole rate of drainage

S.E: Conjunctival congestion

hypertrichosis

darkening of the iris

Very expensive.

④ Osmotic agents:-

which used only in case acute glaucoma

Glycerin → may cause hyperglycemia in D.M pt.

Mannitol may be give in specific dose 1-2 ml / Kg with Isotonic infusion for about 30 min.

Indication: pre operative to ↓ IOP for preventive complication

M.B: pt presented to ER with hx of acute

Congestive glaucoma firstly give Pilocarpine then acetazolamide

* Steroid: الستيرويد

used in combination with antibiotic to prevent 2nd infection

as well as used steroid as hydrocortisone or prednisolone which has good function used after operation to prevent inflammation.

* Osmotic agent :- acute congestive

- in acute Cases of $\downarrow$ glaucoma only.

- glycerin Causes hyperglycemia in pt with D.M

- Mannitol must be given in specific dose 1-2 ml/kg of lasix and infusion for 30 min.

* Indication of osmotic agents :-

1- in Cases of high I.O.P for eg due to lens induced glaucoma before operation.

2- pre-operative to decrease I.O.P to prevent complication.

pt. with acute congestive glaucoma to Emergency Room we give them (pilocarpine - Mannitol and acetazolamide).

* steroids العلاج الستيرويدي

- steroids Commonly used with Combination with Anti-Biotics to prevent secondary infection.

- steroids as hydrocortisone or prednisolone are given after operation of eye to prevent inflammation.

- long acting steroids sometimes are given as injection.

- short acting steroids as hydrocortisone or prednisolone. Usually given after operations to prevent inflammation.

* In allergic Conjunctivitis is an indication of short acting steroids used for (short duration) and before prescribe steroids it is important to be sure of the diagnosis of allergic Conjunctivitis and the case is not infectious Conjunctivitis to not make the condition worse.

* if The patient has severe allergic Conjunctivitis, and he is a child we must give him steroids.
and after improvement. Condition patient. we start to stop steroids drug as gradually to prevent side effect of drugs and Complication on kidney (during systemic steroids).

* long acting steroids as Triamcinolone or Methyl-prednisolone is given in severe cases by injection route for uveitis or severe allergic.

* scleritis is usually Treated by steroids.

Q. 11a

Q. How to differentiate Between scleritis and Conjunctivitis?

As $\Rightarrow$ By Examination of Redness under slit lamp.

* superficial redness moves with Conjunctiva.

* phenylephrine application lead to vasoconstriction.

of Conjunctival vessels. These Two Characters is present in The Case of allergic Conjunctivitis.

$\Rightarrow$ in scleritis Cases application of phenylephrine. ~~The Redness~~
The Redness is not affected and it doesn't disappear.

$\Rightarrow$ Most Cases of scleritis Caused by ^{Ab/Ag} ~~Ab~~ Reaction or Ag.
leads to eye redness, and most Cases of scleritis.
Treated by steroids, as its action is anti-inflammatory.

* Almost Always all Cases of uveitis ~~Treat~~ Treated by steroids. Topical and systemic, and at first given every 3 hours Then gradually decrease with improvement of the case.
* in addition to steroids ~~we~~ give mydriatic and cycloplegic drugs for uveitis.

* Allergic Rhinitis which may be caused by Ag-Ab Reaction also allergy of eye lid or marginal Blepharitis. caused by Ag-Ab reaction

* Marginal Blepharitis $\Rightarrow$ Adhesion Between upper and lower eyelids and the Cornea $\Rightarrow$ Ag-Ab reaction $\Rightarrow$ erosion.

if Corneal erosion resulted Then we given patient steroids.

* Not all Cases of allergy Can Treated by steroids and if you prescribed steroids, you have to write note on the prescription paper (not to be used for long duration).

* steroids not use in viral or Bacterial infection of the eye Except in specific conditions.

* indication of systemic steroids.

- optic neuritis and Retro bulbar neuritis). give Early in the Course of the disease by I.V infection to prevent optic nerve from irreversible damage, caused by inflammation. it is given after admission of The patient and under supervision of the patient,

* when you are not sure or not certain of a Case you want to prescribed steroid. you must first Counsel medication doctor, or Referre the patient to specialist doctor. to give him proper Drugs for patient Condition. (Drug Choise).

* For Contraindication and side effect of steroids?

very important

← إعطاء الستيرويدات

Q Which is more Dangerous glaucoma or cataract?

↑ Ans

Answer → glaucoma is more dangerous. Because it's irreversible Damage $\Leftrightarrow$ while cataract is Treated by I.O.L

* When you prescribe steroid also prescribe Anti-acidic drugs as lomec - Ranitidine. to prevent peptic ulcer as Role for 2 Times / day.

* Hx is Taken from The patient Before giving him steroids especially in patient with H.T.N or osteoporosis... etc.

* patient with H.T.N or osteoporosis we give him Topical steroids to avoid systemic side affects as ↑ B.p or ↓ bone density.

* Ocular lubricant give for dry eye. which increase incidence of dry eye due to Technological uses as Telephones or Computers. for long duration.

* Excessive Blinking is important sign of dry eye especially in children.

* Dryness of The eye There will be small space or holes in The superficial surface of The eye.

and when lubricant is applied in the eye, it fills This space, There are Two Types of eye lubricant with preservation, and without preservatives, which is more preference (selection).

Because we use it for long duration and There is no Irritation of the eye by The preservatives lubricants with preservatives Causes burning sensation. when applied on the eye.

* The only disadvantage of eye lubricant without preservatives is its expensive price.

* Indication of ocular lubricant (drops - ointment) or gel -

- pterygium.
- perigular. $\Rightarrow$ degeneration disease of macula.
- irregular surface.
- Exposure to irritation.
- after operations with improper suturing of the lid

* Anti-allergic Drug:-

$\Rightarrow$ it is important. Because of high prevalence of allergic eye disease in Yemen.

$\Rightarrow$ First advice the patients to avoid factors that cause allergy and to use the anti-allergic drugs for long periods.

* itching in allergic disease is the most important cause of complication in allergic diseases of the eye.

* itching and rubbing of the eye lead to?

- Keratoconus
- ptosis.
- wrinkling.

* in allergic disease of the eye, the eye appears dirty Brownish (Conjunctive) $\Rightarrow$ ptosis - wrinkling - etc.

- Fluorometholone $\Rightarrow$ it is the second steroids use for allergy

* Combination of anti histamine - mast cell stabilizer are used, But you must advise the patient to avoid precipitating Risk Factors as head Cap (غطاء الرأس) to protect his eyes from sun lights, Clean his eyes with Cold water don't rubbing or itching his eyes, and Followup his Doctor.

* KeratoConis is prevented by Treating allergic disease in some Condition.

* ultimately allergic disease may leads to Blindness.